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Your reference: 05765547.4

Our reference: B827 g; 100; drm

Date: 20 March 2009

European Patent Office  
Munchen D-80298  
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83  
30 März 2009

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#### BY FACSIMILE AND POST

Dear Sirs,

European Patent Application No. 05765547.4  
Based on Japanese PCT Application No. PCT/JP2005/012731  
Applicant: Caterpillar Japan Ltd.  
Short title: Control Circuit for Construction Machine

In connection with the Official Communication pursuant to Rule 70(2) EPC dated 9 March 2009, we hereby notify you that the Applicant wishes to proceed further with the application.

#### CONFIRMATION COPY OF PRIOR FAX

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Total 1 page not including any cover sheet



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**Begleitschreiben für nachgereichte Unterlagen (3-fach)**  
**Letter accompanying subsequently filed items (in 3 copies)**  
**Lettre d'accompagnement relative à des pièces produites postérieurement au dépôt (en 3 exemplaires)**

Die unten bezeichnete(n) Unterlage(n) wird (werden) nachgereicht zu folgender Patentanmeldung/folgendem Patent:  
The item(s) indicated below is (are) subsequently filed for the following application/patent:  
La (Les) pièce(s) désignée(s) ci-après est (sont) produite(s) postérieurement au dépôt, pour la demande (le brevet) suivant(e) :

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| 05765544. 4 |
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Anmeldenummer / Application No. / N° de la demande  
(Nur ein Aktenzeichen pro Formblatt)  
(Only one file number per form)  
(Un numéro de dossier par formulaire seulement)

|       |
|-------|
| B 827 |
|-------|

Zeichen des Anmelders oder Vertreters  
Applicant's or representative's reference  
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| Bezeichnung der Unterlagen / Description of items / Description des pièces  | Bemerkungen des EPA<br>Comments of EPO<br>Remarques de l'OEB |
|---|--|
| RESPONSE TO THE OFFICIAL COMMUNICATION<br>1. DATED 9 MARCH 2009, CONCERNING THAT THE<br>APPLICANT WISHES TO PROCEED FURTHER WITH<br>THIS APPLICATION. |  |
| 3.  |  |
| 4.  |  |
| 5.  |  |

Datum / Date

20/3/09

Unterschrift(en) des (der) Anmelder(s) oder Vertreter(s) / Signature(s) of applicant(s) or representative(s) /  
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Name des (der) Unterzeichneten bitte in Druckschrift wiederholen. Bei juristischen Personen bitte die Stellung des (der) Unterzeichneten innerhalb der Gesellschaft in Druckschrift angeben. / Please print name under signature. In case of legal persons, the position of the signatory within the company should also be printed. / Le ou les noms des signataires doivent être indiqués en caractères d'imprimerie. S'il s'agit d'une personne morale, la position occupée au sein de celle-ci par le ou les signataire(s) doit être indiquée en caractères d'imprimerie.

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Der Eingang der oben angegebenen Unterlagen wird bestätigt, falls im Feld „Bemerkungen des EPA“ nichts anderes vermerkt ist. Datum und Ort des Eingangs sind aus dem Eingangsstempel bzw. der Perforation dieser Eingangsbestätigung ersichtlich (M + Datum = Einreichungsstadt München; H + Datum = Einreichungsstadt Den Haag, Datum + B = Einreichungsstadt Berlin).

Unless otherwise indicated in the space „Comments of EPO“, receipt of the items indicated is acknowledged. Date and place of receipt are shown by the receipt stamp or the perforation appearing on this receipt (M + date = Munich as place of receipt; H + date = The Hague as place of receipt; date + B = Berlin as place of receipt).

La réception des pièces susmentionnées est confirmée, sauf mention contraire à l'emplacement "Remarques de l'OEB". La date et le lieu de réception sont indiqués par le cachet de réception ou la perforation du présent accusé de réception (M + date = pièces reçues à Munich; H + date = pièces reçues à La Haye ; date + B = pièces reçues à Berlin).



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Date

09.03.09

|  |  |
|--|--|
| Reference<br>B827                              | Application No./Patent No.<br>05765547.4 - 2316 / 1832685 PCT/JP2005012731 |
| Applicant/Proprietor<br>Caterpillar Japan Ltd. |  |

**Proceeding further with the European patent application pursuant to Rule 70(2) EPC**

A supplementary European search report has been drawn up concerning the above European patent application (publication number 1832685).

Since a request for examination has been filed (R. 70(1) EPC) and the examination fee has been paid (Art. 94(1) EPC) prior to the transmission of the supplementary European search report, you are hereby invited to indicate within

**two months**

of notification of this invitation whether you desire to proceed further with the European patent application.

If you do not indicate in due time that you desire to proceed further with the European patent application, it will be deemed to be withdrawn (R. 70(3) EPC).

If you wish you may comment on the supplementary European search report and amend, where appropriate, the description, claims and drawings (R. 70(2) EPC).

**Receiving Section**





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18.02.09

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| Reference<br>B827                              | Application No./Patent No.<br>05765547.4 - 2316 / 1832685 PCT/JP2005012731 |
| Applicant/Proprietor<br>Caterpillar Japan Ltd. |  |

### Communication

The extended European search report is enclosed.

The extended European search report includes, pursuant to Rule 62 EPC, the supplementary European search report (Art. 153(7) EPC) and the European search opinion.

Copies of documents cited in the European search report are attached.

0 additional set(s) of copies of such documents is (are) enclosed as well.

### Refund of the search fee

If applicable under Article 9 Rules relating to fees, a separate communication from the Receiving Section on the refund of the search fee will be sent later.



The examination is being carried out on the **following application documents**:

**Description, Pages**

1-32 as originally filed

**Claims, Numbers**

1-4 as originally filed

**Drawings, Sheets**

1/8-8/8 as originally filed

**1 Inventive step**

**1.1 Independent claim 1**

Document JP-A-07305379 (=D1) is considered to be the closest prior art to the subject-matter of claim 1 and discloses (the references in parentheses applying to this document):

A control circuit for a construction machine (see title and fig. 5, 6), said control circuit comprising an open center circuit (fig. 5) including center bypass lines (Ps) passing through at least a boom operating valve (241, 242), a stick operating valve (251, 252), and a bucket operating valve (261) that are adapted to control hydraulic fluid fed from hydraulic pumps (28) to boom cylinders (24), a stick cylinder (25), and a bucket cylinder (26) and subsequently returned through return lines (T) to a tank, said boom cylinders (24) serving to operate a boom (15), said stick cylinder (25) serving to operate a stick (16) connected to a distal end of said boom (15), and said bucket cylinder (26) serving to operate a bucket (17) connected to a distal end of said stick (16), wherein said control circuit further includes: a pressure-compensating flow control valve (45+46) provided on a return line (44) for hydraulic fluid returned from a rod side (25b) of said stick cylinder (25) to said tank.

The subject-matter of claim 1 therefore differs from this known D1 in that: The control circuit further includes a pressure sensor for detecting pressure of hydraulic fluid fed to a head side of said boom cylinders; and a pressure control valve for controlling a portion of the center bypass line that passes through said boom operating valve so as to increase the pressure in accordance with an increase in the pressure detected by said pressure sensor, said portion being downstream from said boom operating valve.

The technical effect is by generating a boom holding pressure in the center bypass line to ensure a stable fluid flow regardless of changes in load pressure in the boom cylinder. The problem to be solved by the present invention may therefore be regarded as to improve operability of hydraulic construction machine.

Document JP-A-07042703 (=D2) discloses on fig. 6 part of a hydraulic circuit for construction machine with a pressure sensor (65) for detecting pressure of hydraulic fluid fed to a head side (3b) of a cylinder (here a boom cylinder 3) and a pressure control valve 62 for controlling a portion of the center bypass line (30a) that passes through the corresponding operating valve (30) of the cylinder (3) so as to increase the pressure in accordance with an increase in the pressure detected by said pressure sensor (see first sentence of par. [0014] of the electronic translation), said portion being downstream from said operating valve (30). Those features are described in document D2 as securing superior metering characteristics even in the case of heavy loading as well as light loading (see abstract), which means to improve the operability of the construction machine, which is the same advantage as in the present application. The skilled person would therefore regard it as a normal design procedure to include those features in the control circuit described in document D1 in order to solve the above mentioned problem.

The subject-matter of claim 1 does not therefore involve an inventive step in the sense of Art. 56 EPC.

## 1.2 Dependent claims

Dependent claims 2 to 4 do not appear to contain any additional features which, in combination with the features of any claim to which they refers, meet the requirements of the EPC with respect to inventive step (art. 56 EPC).

### - Claim 2

The features of D2 to improve operability of the construction machine can be applied to any hydraulic cylinder of a control circuit of a construction machine. On fig. 6, D2 shows a pressure sensor (66) for detecting pressure to the rod side (3a) of a cylinder (boom cylinder 3, applicable to a stick cylinder) and a pressure control valve (62) as defined in claim 2 (see point 1.1).

### - Claim 3

Fig. 6 of D2 discloses a pressure control valve with an orifice 4 and a relief valve (62), the formed negative flow control pressure in the center bypass line controls the pump discharge rate (through line 5).

- Claim 4

The features of the pressure-compensating valve as defined in claim 4 are shown in D1 on fig. 1 (with spring 59 and its adjustment system 56+61).

2 Conclusion

- 2.1 Independent claim 1 is not in the two-part form in accordance with Rule 43(1) EPC.
- 2.2 The features of the claims should be provided with reference signs placed in parentheses to increase the intelligibility of the claims (Rule 43(7) EPC). This applies to both the preamble and characterising portion (see Guidelines C-III, 4.19).
- 2.3 To meet the requirements of Rule 42(1)(b) EPC, the documents D1 and D2 should be identified in the description and the relevant background art disclosed therein should be briefly discussed.
- 2.4 It is not at present apparent which part of the application could serve as a basis for a new, allowable claim. Should the applicant nevertheless regard some particular matter as patentable, an independent claim should be filed taking account of Rule 43(1) EPC. The applicant should also indicate how the subject-matter of the new claim differs from the state of the art and the significance thereof.

The attention of the applicant is drawn to the fact that the application may not be amended in such a way that it contains subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC).



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**SUPPLEMENTARY  
EUROPEAN SEARCH REPORT**

Application Number  
**EP 05 76 5547**

| <b>DOCUMENTS CONSIDERED TO BE RELEVANT</b>  |  |  | <b>CLASSIFICATION OF THE APPLICATION (IPC)</b> |
|---|--|--|--|
| <b>Category</b>   | <b>Citation of document with indication, where appropriate, of relevant passages</b>                       | <b>Relevant to claim</b>                                   |  |
| Y   | JP 07 305379 A (CATERPILLAR MITSUBISHI LTD) 21 November 1995 (1995-11-21)<br>* abstract; figures 1,2,5,6 * | 1-4  | INV.<br>E02F9/22<br>F15B11/00<br>F15B11/028    |
| Y   | JP 07 042703 A (HITACHI CONSTRUCTION MACHINERY) 10 February 1995 (1995-02-10)<br>* abstract; figure 6 *    | 1-4  |  |
| A   | JP 10 310365 A (SUMITOMO CONSTR MACH) 24 November 1998 (1998-11-24)<br>* abstract; figures 2,3 *           | 1  |  |
| A   | EP 0 629 781 A (HITACHI CONSTRUCTION MACHINERY [JP]) 21 December 1994 (1994-12-21)<br>* figure 16 *        | 1  |  |
| The supplementary search report has been based on the last set of claims valid and available at the start of the search.  |  |  | <b>TECHNICAL FIELDS SEARCHED (IPC)</b>         |
|   |  |  | E02F<br>F15B                                   |
| 1   | Place of search<br><b>Munich</b>   | Date of completion of the search<br><b>15 January 2009</b> | Examiner<br><b>Bultot, Coralie</b>             |
| <b>CATEGORY OF CITED DOCUMENTS</b> <p>X : particularly relevant if taken alone<br/>     Y : particularly relevant if combined with another document of the same category<br/>     A : technological background<br/>     O : non-written disclosure<br/>     P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>     E : earlier patent document, but published on, or after the filing date<br/>     D : document cited in the application<br/>     L : document cited for other reasons<br/>     &amp; : member of the same patent family, corresponding document</p> |  |  |  |

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

**EP 05 76 5547**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
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**15-01-2009**

| Patent document<br>cited in search report |   | Publication<br>date |      | Patent family<br>member(s) |  | Publication<br>date |
|---|---|---------------------|------|----------------------------|--|---------------------|
| JP 7305379                                | A | 21-11-1995          | JP   | 3009822 B2                 |  | 14-02-2000          |
| JP 7042703                                | A | 10-02-1995          | NONE |                            |  |                     |
| JP 10310365                               | A | 24-11-1998          | NONE |                            |  |                     |
| EP 0629781                                | A | 21-12-1994          | DE   | 69302012 D1                |  | 02-05-1996          |
|   |   |                     | DE   | 69302012 T2                |  | 05-09-1996          |
|   |   |                     | WO   | 9413959 A1                 |  | 23-06-1994          |
|   |   |                     | JP   | 3139769 B2                 |  | 05-03-2001          |
|   |   |                     | US   | 5442912 A                  |  | 22-08-1995          |